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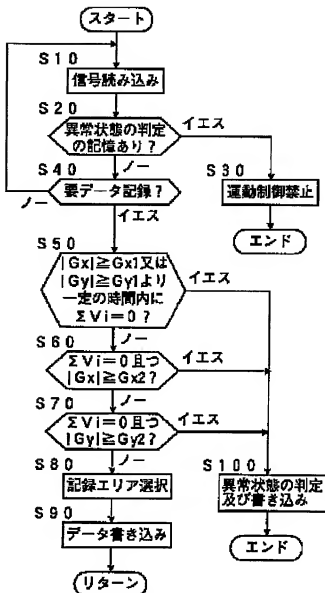
(54) VEHICULAR DATA RECORDING DEVICE

(57) Abstract:

PROBLEM TO BE SOLVED: To reliably store the traveling data just before a vehicle becomes an abnormal state.

SOLUTION: When recording of the traveling data of a vehicle is required (S40), the traveling data is recorded (S80, 90) in a nonvolatile memory by overwriting. When the vehicle becomes an abnormal state such as collision, recording is prohibited, and the recorded traveling data is maintained (S100). The judgement whether or not the vehicle becomes an abnormal state is performed on the basis of the judgement (S50) whether the vehicle becomes a stopped state within the specified time T_c from the time when an absolute value of the longitudinal acceleration G_x becomes not less than a reference value G_{x1} or an absolute value of the lateral acceleration G_y becomes not less than a reference value G_{y1} , the judgement (S60) whether or not the vehicle is in the stopped state and an absolute value of the longitudinal acceleration G_x of the vehicle is not less than a reference value G_{x2} , and the judgement (S70) whether or not the vehicle is in the stopped state and an absolute value of the lateral acceleration G_y of the vehicle is not less than a reference value G_{y2} .

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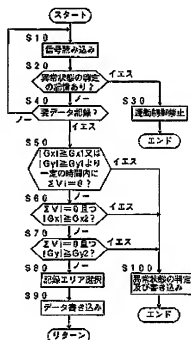
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(54) 【発明の名称】 車両用データ記録装置

(57) 【要約】

【課題】 車両が異常状態になる直前の走行データを確実に保存する。

【解決手段】 車両の走行データの記録が必要であるときには (S40)、揮発性メモリに走行データを上書きにより記録する (S80、90) が、車両が衝突の如き異常状態になると記録を禁止しそれまでに記録されている走行データを維持する (S100)。車両が異常状態になったか否かの判断は、前後加速度 G_x の絶対値が基準値 G_{x1} 以上である状態又は横加速度 G_y の絶対値が基準値 G_{y1} 以上である状態になった時点より所定の時間 T 以内に車両が停止状態になったか否かの判断 (S50) 車両が停止状態にあり且つ車両の前後加速度 G_x の絶対値が基準値 G_{x2} 以上であるか否かの判断 (S60)、車両が停止状態にあり且つ車両の横加速度 G_y の絶対値が基準値 G_{y2} 以上であるか否かの判断 (S70) により行われる。



【特許請求の範囲】

【請求項 1】 車輛の走行データを記録する記録手段と、車輛の異常状態を判定する異常状態判定手段と、前記異常状態判定手段の判定結果に基づき前記記録手段を制御する制御手段とを有する車輛用データ記録装置に於いて、前記異常状態判定手段は車輛の加速度的大きさが基準値以上であるか否かを判定する加速度判定手段と、車速が基準値以下であるか否かを判定する車速判定手段とを有し、前記加速度判定手段及び前記車速判定手段の判定結果に基づき車輛の異常状態を判定することを特徴とする車輛用データ記録装置。

【請求項 2】 前記異常状態判定手段は前記加速度判定手段により車輛の加速度的大きさが基準値以上であると判定された時点より所定の時間以内に前記車速判定手段により車速が基準値以下であると判定されたときに車輛の異常状態と判定することを特徴とする請求項 1 に記載の車輛用データ記録装置。

【請求項 3】 前記異常状態判定手段は前記車速判定手段により車速が基準値以下であると判定され且つ前記加速度判定手段により車輛の加速度的大きさが基準値以上であると判定されたときに車輛の異常状態と判定することを特徴とする請求項 1 に記載の車輛用データ記録装置。

【請求項 4】 前記車速判定手段は車速が実質的に 0 であるときに車速が基準値以下であると判定することを特徴とする請求項 1乃至 3 の何れかに記載の車輛用データ記録装置。

【請求項 5】 前記記録手段は車輛の走行データを記憶する記憶手段を含み、該記憶手段に走行データを上書きに書き込むことにより記録し、前記制御手段は前記異常状態判定手段により車輛の異常状態が判定されたときには前記記録手段による記録を禁止することを特徴とする請求項 1乃至 4 の何れかに記載の車輛用データ記録装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、車輛用データ記録装置に係り、更に詳細には車輛の走行データを記録するデータ記録装置に係る。

【0002】

【従来の技術】 自動車等の車輛のデータ記録装置の一つとして、例えば本願出願人の出願にかかる特開平 7-249137 号公報に記載されている如く、車輛の走行データを記憶手段に順次上書き保存することにより記録し、車輛の加速度的大きさが基準値以上であるときには車輛が異常状態になったと判定して記憶手段に対する上書き保存を中止するよう構成されたデータ記録装置が従来より知られている。

【0003】 かかるデータ記録装置によれば、車輛の走行データを記憶手段に順次上書き保存することにより記録されるので、記憶容量の大きい記憶手段は不要であ

り、また車輛の加速度的大きさが基準値以上になったときには記憶手段に対する上書き保存が中止されるので、車輛の加速度的大きさが基準値以上になる直前の走行データを確実に保存することができる。

【0004】

【発明が解決しようとする課題】 しかし上述の如き従来のデータ記録装置に於いては、車輛の加速度的大きさが基準値以上であるときに車輛が異常状態になったと判定されるようになっているため、車輛が異常状態になってもその異常状態を判定することができない場合がある。即ち車輛の通常走行時にも車輛の加速度が比較的高い値になる場合があるので、車輛の加速度的大きさに基づき車輛の異常状態が判定される場合には、異常状態判定の基準値を比較的高い値に設定せざるを得ず、そのため車輛の衝突の如き異常状態が生じてもその異常状態が判定されず、従って車輛が異常状態になる直前の走行データを保存することができない場合がある。

【0005】 本発明は、車輛の加速度的大きさが基準値以上であるときに記憶手段に対する走行データの書き込みが中止されるよう構成された従来のデータ記録装置に於ける上述の如き問題に鑑みてなされたものであり、本発明の主要な課題は、車輛が異常状態になったときにはそのことを確実に判定することにより、車輛が異常状態になる直前の走行データを確実に保存することである。

【0006】

【課題を解決するための手段】 上述の主要な課題は、本発明によれば、請求項 1 の構成、即ち車輛の走行データを記録する記録手段と、車輛の異常状態を判定する異常状態判定手段と、前記異常状態判定手段の判定結果に基づき前記記録手段を制御する制御手段とを有する車輛用データ記録装置に於いて、前記異常状態判定手段は車輛の加速度的大きさが基準値以上であるか否かを判定する加速度判定手段と、車速が基準値以下であるか否かを判定する車速判定手段とを有し、前記加速度判定手段及び前記車速判定手段の判定結果に基づき車輛の異常状態を判定することを特徴とする車輛用データ記録装置によって達成される。

【0007】 一般に、車輛が衝突すると、衝突と同時に車輛の減速度が急激に上昇して加速度的大きさが非常に大きい値になると共に車速が非常に小さい値に急激に低下するのに対し、車輛の通常走行時に加速度的大きさが比較的大きくなる場合の車速は一般に比較的高い、また車輛の衝突等により車輛の加速度を検出するセンサの取り付け位置が異常になったり車輛自体が異常に傾斜した状態になると、センサは車輛の通常の走行時や停車時には示さない非常に高い値を定常的に示すようになる。従って車輛の加速度に加えて車速を考慮することにより、車輛の衝突の如き異常状態を確実に判定することができる。

【0008】上記請求項1の構成によれば、加速度判定手段及び車速判定手段の判定結果に基づき車輪の異常状態が判定されるので、車輪の通常の走行時や停車時に加速度の大きさが比較的大きくなる場合を区別して車輪の異常状態を確実に判定することが可能になり、これにより車輪が異常状態になる直前の走行データを確実に保存することが可能になる。

【0009】また本発明によれば、上述の主要な課題を効果的に達成すべく、上記請求項1の構成に於いて、前記異常状態判定手段は前記加速度判定手段により車輪の加速度の大きさが基準値以上であると判定された時点より所定の時間以内に前記車速判定手段により車速が基準値以下であると判定されたときに車輪の異常状態と判定するよう構成される（請求項2の構成）。

【0010】請求項2の構成によれば、加速度判定手段により車輪の加速度の大きさが基準値以上であると判定された時点より所定の時間以内に車速判定手段により車速が基準値以下であると判定されたときに車輪の異常状態と判定されるので、車輪の加速度判定の基準値を高くする必要がなく、これにより車輪の異常状態が確実に判定される。

【0011】また本発明によれば、上述の主要な課題を効果的に達成すべく、上記請求項1の構成に於いて、前記異常状態判定手段は前記車速判定手段により車速が基準値以下であると判定され且つ前記加速度判定手段により車輪の加速度の大きさが基準値以上であると判定されたときに車輪の異常状態と判定するよう構成される（請求項3の構成）。

【0012】請求項3の構成によれば、車速判定手段により車速が基準値以下であると判定され且つ加速度判定手段により車輪の加速度の大きさが基準値以上であると判定されたときに車輪の異常状態と判定されるので、車輪の加速度判定の基準値を高くする必要がなく、これにより車輪の異常状態が確実に判定される。

【0013】また本発明によれば、上述の主要な課題を効果的に達成すべく、上記請求項1乃至3の何れかの構成に於いて、前記車速判定手段は車速が実質的に0であるときに車速が基準値以下であると判定するよう構成される（請求項4の構成）。

【0014】請求項4の構成によれば、車速が実質的に0であるときに車速が基準値以下であると判定されるので、車輪の通常の走行時に加速度の大きさが比較的大きくなる状況に於いて車輪の異常状態と判定されることが確実に防止される。

【0015】また本発明によれば、上述の主要な課題を効果的に達成すべく、上記請求項1乃至4の何れかの構成に於いて、前記記録手段は車輪の走行データを記憶する記憶手段を含み、前記記録手段は走行データを上書きして書き込むことにより記録し、前記制御手段は前記異常状態判定手段により車輪の異常状態が判定されたときに

は前記記録手段による記録を禁止するよう構成される（請求項5の構成）。

【0016】請求項5の構成によれば、異常状態判定手段により車輪の異常状態が判定されたときには記録手段による記録が禁止され、これにより車輪が異常状態になった時点以降のデータが記憶手段に上書きされることが、換言すれば車輪が異常状態になる直前の走行データが消去されることが確実に防止される。

【0017】

【課題解決手段の好ましい態様】本発明の一つの好ましい態様によれば、上記請求項1の構成に於いて、記録手段は車輪の走行データを記録すべきか否かを判定する記録判定手段と、走行データを記憶する記憶手段と、記録判定手段により走行データを記録すべき旨の判定が行われたときには記憶手段に走行データを書き込む手段とを有するよう構成される（好ましい態様1）。

【0018】本発明の他の一つの好ましい態様によれば、上記好ましい態様1の構成に於いて、記録判定手段は所定の時間毎に車輪の走行データを記録すべきか否かを判定するよう構成される（好ましい態様2）。

【0019】本発明の他の一つの好ましい態様によれば、上記請求項1の構成に於いて、車輪は走行時の車輪の運動安定化のための運動制御を行う運動制御装置を有し、記録判定手段は運動制御装置により運動制御が行われているときに走行データを記録すべき旨の判定を行うよう構成される（好ましい態様3）。

【0020】本発明の他の一つの好ましい態様によれば、上記請求項1の構成に於いて、記録判定手段は車輪の横加速度を検出する手段を含み、車輪の横加速度の大きさが基準値以上であるときに走行データを記録すべき旨の判定を行うよう構成される（好ましい態様4）。

【0021】本発明の他の一つの好ましい態様によれば、上記請求項2の構成に於いて、加速度判定手段は車輪の前後加速度の大きさが対応する基準値以上であるか否かを判定すると共に車輪の横加速度の大きさが対応する基準値以上であるか否かを判定し、加速度判定手段による車輪の前後加速度の大きさが対応する基準値以上であると判定された時点又は車輪の横加速度の大きさが対応する基準値以上であると判定された時点より所定の時間以内に車速判定手段により車速が基準値以下であると判定されたときに車輪の異常状態と判定するよう構成される（好ましい態様5）。

【0022】本発明の他の一つの好ましい態様によれば、上記請求項3の構成に於いて、加速度判定手段は車輪の前後加速度の大きさが対応する基準値以上であるか否かを判定すると共に車輪の横加速度の大きさが対応する基準値以上であるか否かを判定し、車速判定手段により車速が基準値以下であると判定され且つ加速度判定手段により車輪の前後加速度の大きさが対応する基準値以上であると判定されたとき又は車速判定手段により車速

が基準値以下であると判定され且つ加速度判定手段により車輪の備加速度の大きさが対応する基準値以上であると判定されるときに車輪の異常状態と判定するよう構成される（好ましい態様6）。

【0023】本発明の他の一つの好ましい態様によれば、上記請求項5の構成に於いて、記憶手段は複数の記憶エリアを有し、最も古い走行データを記憶している記憶エリアに走行データを上書きにて書き込むよう構成される（好ましい態様7）。

【0024】

【発明の実施の形態】以下に添付の図を参照しつつ、本発明を好ましい実施形態について詳細に説明する。

【0025】図1は運動制御装置が搭載された車輪に適用された本発明による車輪用走行データ記録装置の一つの好ましい実施形態を示す概略構成図。図2は図1に示された走行データ記録装置を示すブロック図である。

【0026】図1に於て、10FL及び10FRはそれぞれ車輪12の左右の前輪を示し、10RL及び10RRはそれぞれ車輪の左右の後輪を示している。各車輪の制動力は制動装置14の油圧回路16によりホイールシリンダ18FR、18FL、18RR、18RLの制動圧が制御されることにより制御されるようになっている。図には示されていないが、油圧回路16はオイルリザーバ、オイルポンプ、検々の弁装置等を含み、各ホイールシリンダの制動力は通常時には運転者によるブレーキペダル20の踏み込み操作により駆動されるマスタシリンダ22内の圧力に応じて運動制御用制動装置24により制御される。

【0027】車輪10FR〜10RLに近接した位置にはそれぞれ各車輪の車輪速度 V_i ($i = fr, fl, rr, rl$) を検出する車輪速度センサ28FR、28FL、28RR、28RLが設けられている。また車輪12にはそれぞれ車体の前後加速度 G_x を検出する前後加速度センサ30、横加速度 G_y を検出する横加速度センサ32、操舵角 θ を検出する操舵角センサ34が設けられている。各センサにより検出された値を示す信号は運動制御用制動装置24に入力され、また運動制御用制動装置24を経て走行データ記録用制動装置40に入力される。

【0028】運動制御用制動装置24は車輪速度センサ28FR〜28RLにより検出された車輪速度 V_i に基づき各車輪の制動スリップ率 R_s を演算し、制動スリップ率 R_s が基準値 R_{so} （正の定数）以上になると当該車輪の制動スリップ率 R_s が所定の範囲内になるよう制動力を増減するアンチスキッド制御を開始し、予め設定された終了条件が成立するとアンチスキッド制御を終了する。

【0029】かくして運動制御用制動装置24は車輪の制動スリップが過剰になり車輪の走行時の運動が不安定になる虞れがあるときには、制動装置14と共働して車輪の制動スリップを適正化させることにより車輪の走行時の安定性を向上させる運動制御装置を構成しているが、後述の如く走行データ記録用制動装置40より車輪

の運動制御を禁止する旨の信号が入力されると、運動制御（アンチスキッド制御）を行わない。

【0030】尚運動制御用制動装置24により実行される運動制御としてのアンチスキッド制御は本発明の要旨をなすものではなく、当該分野に於いて公知の任意の要領にて実行されよう。また運動制御用制動装置24はアンチスキッド制御に加えて制動力の制御によるトラクション制御や挙動安定化制御の如き他の運動制御を行うようになっている。また運動制御用制動装置24はアンチスキッド制御に加えて制動力の制御によるトラクション制御や挙動安定化制御の如き他の運動制御を行うようになっている。

【0031】図2に示されている如く、走行データ記録用制動装置40は例えばCPU42とROM44とRAM46と出力ポート装置48とを有しこれらが双方向性のコンパバス50により互いに接続された一体的な構成のマイクロコンピュータ52を含み、また外部記憶装置として不揮発性のメモリであるEEPROM54を含んでいる。

【0032】走行データ記録用制動装置40は、後述の如く備加速度 G_x 又は運動制御用制動装置24よりの情報に基づき各センサにより検出された状態量、即ち車輪の走行データを記録すべき否かを定期的に判定し、走行データを記録すべき旨の判定が行われたときにはEEPROM54に走行データを記録する。

【0033】更に走行データ記録用制動装置40は、車輪速度 V_i 、後加速度 G_x 、横加速度 G_y に基づき後述の如く車輪が異常状態になったか否かを判定し、車輪が異常状態になっていない旨の判定が行われたときには走行データの記録を許可するが、車輪が異常状態になった旨の判定が行われたときにはそれ以降の走行データが上書きにより記録されることを禁止する。

【0034】図示の実施形態に於いては、EEPROM44は図3に示されている如く三つの記憶エリアM1〜M3を有し、各記憶エリアはそれぞれ記録タイミングに関する識別情報としてのID番号を記憶するセクションS1と、車輪速度 V_{fr} 、 V_{fl} 、 V_{rr} 、 V_{rl} 、前後加速度 G_x 、横加速度 G_y 、操舵角 θ 、右前輪、左前輪、右後輪、左後輪の制動スリップ率 R_{sfr} 、 R_{sfl} 、 R_{srr} 、 R_{srl} の各走行データを記憶するセクションS2と、車輪が異常状態になったか否かの判定結果を記憶するセクションS3とを有している。

【0035】ID番号は例えば0〜9の数字よりなり、データの記録順により順番に9まで使用され、9の次には0に戻って繰り返し使用される。またデータの記録は記憶エリアM1、M2、M3、M1、M2…の順に上書きにより繰り返し行われる。従って記憶エリアM1〜M3のセクションS1に記録されたID番号により何れのデータの最新のデータであり何れのデータが最も古いデータであるかを判定することができる。

【0036】尚図2には詳細に示されていないが、運動制御用制動装置24もCPUとROMとRAMと出力ポート装置とを有し、これらが双方向性のコンパバスによ

り互いに接続された一般的な構成のマイクロコンピュータを含んでいる。

【0037】次に図4に示されたフローチャートを参照して図示の実施形態に於ける車輛の走行データの記録制御について説明する。尚図4に示されたフローチャートによる制御は図3に示されていないイグニッションスイッチの閉成により開始され、所定の時間毎に繰返し実行される。

【0038】まずステップ10に於いては車輛速度センサ28FR〜28RLにより検出された車輛速度 V を示す信号等が運動制御用制御装置24を経て読み込まれると共に、運動制御用制御装置24より運動制御としてのアンチスキッド制御が行われているか否かを示す信号が読み込まれる。尚各センサの検出値を示す信号はそれぞれ対応するセンサより直接読み込まれてもよい。

【0039】ステップ20に於いては何れかの記憶エリアのセクションS3に車輛が異常状態になったことを示す情報が記憶されているか否かの判別が行われ、肯定判別が行われたときにはステップ30に於いて運動制御用制御装置24に運動制御を禁止すべき旨の信号が出力された後走行データの記録制御が終了し、否定判別が行われたときにはステップ40へ進む。

【0040】ステップ40に於いては車輛の走行データの記録が必要であるか否かの判別が行われ、否定判別が行われたときにはステップ10へ戻り、肯定判別が行われたときにはステップ50へ進む。

【0041】尚走行データの記録が必要であるか否かの判別は、例えば車輛の横加速度 G_y の絶対値が基準値 G_{y0} （正の定数）以上であるか否かの判別及び運動制御用制御装置24による運動制御（アンチスキッド制御又は他の運動制御）が行われているか否かの判別により行われ、横加速度 G_y の絶対値が基準値 G_{y0} 以上である旨の判別又は運動制御用制御装置24による運動制御が行われている旨の判別が行われたときには走行データの記録が必要であると判定されてよい。

【0042】ステップ50に於いては各車輛の車輛速度 V の相対 V_1 が選択されると共に、前後加速度 G_x の絶対値が基準値 G_{x1} （正の定数）以上である状態又は横加速度 G_y の絶対値が基準値 G_{y1} （正の定数）以上である状態になった時点より所定の時間 T_c （正の定数）以内に車輛速度の相対 V_1 が0になったか否かの判別、即ち車輛の前後加速度又は横加速度の大きさが非常に高い値になった後に車輛が停止したか否かの判別が行われ、肯定判別が行われたときにはステップ10へ進み、否定判別が行われたときにはステップ60へ進む。

【0043】尚ステップ50に於ける判別の基準値 G_{x1} 及び G_{y1} はそれぞれ車輛の通常の走行時（通常の加速減速や坂道などの走行を含む）に於いては生じない比較的大きい値に設定される。

【0044】ステップ60に於いては各車輛の車輛速度

V_1 の相対 V_1 が0であり且つ車輛の前後加速度 G_x の絶対値が基準値 G_{x2} （正の定数）以上であるか否かの判別、即ち車輛が停止状態にあり且つ検出される車輛の前後加速度の大きさが非常に高い値であるか否かの判別が行われ、肯定判別が行われたときにはステップ10へ進み、否定判別が行われたときにはステップ70へ進む。

【0045】ステップ70に於いては各車輛の車輛速度 V_1 の相対 V_1 が0であり且つ車輛の横加速度 G_y の絶対値が基準値 G_{y2} （正の定数）以上であるか否かの判別、即ち車輛が停止状態にあり且つ検出される車輛の横加速度の大きさが非常に高い値であるか否かの判別が行われ、肯定判別が行われたときにはステップ10へ進み、否定判別が行われたときにはステップ80へ進む。

【0046】尚ステップ60及び70に於ける判別の基準値 G_{x2} 及び G_{y2} はそれぞれ車輛の通常の停車状態（坂道などの停車を含む）に於いては生じない比較的大きい値に設定される。

【0047】ステップ80に於いてはEEPROM44の記憶エリアM1〜M3のうち最も古いデータが書き込まれている記憶エリアが今回のデータを記録するための記録エリアとして選択され、ステップ90に於いては該サイクルに於いて読み込まれた車輛の走行データがステップ80に於いて選択された記録エリアに上書きにより書き込まれ、しかる後ステップ10へ戻る。

【0048】ステップ100に於いては車輛が衝突の如き異常状態にある旨の判定が行われ、記憶エリアM1〜M3のうち前回走行データが記録されたエリアが記録エリアとして選択されると共に、車輛が衝突の如き異常状態にある旨の情報が選択された記録エリアのセクションS3に書き込まれ、しかる後ステップ10へ戻る。

【0049】かくして図示の実施形態によれば、ステップ20に於いて車輛が事故後の状態の如き異常状態になっているか否かの判別が行われ、異常な状態になっているときにはステップ20に於いて肯定判別が行われ、ステップ30に於いて運動制御用制御装置24による運動制御が禁止されるので、異常な状態のセンサにより検出された異常な状態量に基づき不適切な運動制御が行われることを確実に防止することができる。

【0050】また車輛が正常な状態にあるときには、ステップ20に於いて否定判別が行われ、ステップ40に於いて車輛の走行データの記録が必要であるか否かの判別が行われる。車輛が通常の走行状態にあるときにはステップ40に於いて否定判別が行われることにより、走行データの記録は行われないが、車輛の横加速度の大きさが非常に高い値であるような状況に於いてはステップ40に於いて肯定判別が行われ、ステップ50〜70に於いて車輛が異常な状態になっている旨の判別が行われない限り、ステップ80及び90に於いて走行データが記録される。

【0051】これに対し車輛が異常な状態になっているときには、ステップ50〜70の何れかに於いて肯定判別が行われ、ステップ100に於いて異常状態の判定が行われると共にその情報も記録される。これによりEEPROM44に対する上書きによる走行データの記録が禁止される。

【0052】従って車輛が衝突等により異常状態になると、それ以降の走行データの記録は行われずそれまでにEEPROM44に記憶されている走行データの記録が維持されるので、車輛が異常状態になる直前の走行データを確実に保存することができる。

【0053】特に図示の実施形態によれば、車輛が異常な状態になっているか否かの判別はステップ50〜70により行われ、ステップ50に於いては前後加速度 G_x の絶対値が基準値 G_{x1} 以上である状態又は横加速度 G_y の絶対値が基準値 G_{y1} 以上である状態になった時点より所定の時間 T_d 以内に車輛が停止状態になったか否かの判別が行われるので、車輛の衝突等により加速度の大きさが非常に大きくなった後車輛が停止したような異常な状態を確実に判定することができる。

【0054】またステップ60及び70に於いては、それぞれ車輛が停止状態にあり且つ車輛の前後加速度 G_x の絶対値が基準値 G_{x2} 以上であるか否かの判別及び車輛が停止状態にあり且つ車輛の横加速度 G_y の絶対値が基準値 G_{y2} 以上であるか否かの判別が行われるので、車輛の衝突等により前後加速度センサ30や横加速度センサ32の取り付け状態が異常になったり車輛自体が異常に傾斜したような異常状態を確実に判定することができる。

【0055】以上に於いては本発明を特定の実施形態について詳細に説明したが、本発明は上述の実施形態に限定されるものではなく、本発明の範囲内にて他の種々の実施形態が可能であることは当業者にとって明らかである。

【0056】例えば上述の実施形態に於いては、ステップ50に於いて前後加速度 G_x の絶対値が基準値 G_{x1} 以上である状態又は横加速度 G_y の絶対値が基準値 G_{y1} 以上である状態になった時点より所定の時間 T_d 以内に車輛が停止状態になったか否かの判別が行われるようになっていて、車輛の加速度 G_{xy} が前後加速度 G_x の2乗と横加速度 G_y の2乗との和の平方根 $(\sqrt{G_x^2 + G_y^2})$ として演算され、車輛の加速度 G_{xy} の絶対値が基準値 G_{xy1} （正の定数）以上である状態になった時点より所定の時間 T_d 以内に車輛が停止状態になったか否かの判別が行われてもよい。

【0057】同様に上述の実施形態に於いては、ステップ60及び70に於いてそれぞれ車輛が停止状態にあり且つ車輛の前後加速度 G_x の絶対値が基準値 G_{x2} 以上であるか否かの判別及び車輛が停止状態にあり且つ車輛の横加速度 G_y の絶対値が基準値 G_{y2} 以上であるか否かの

判別が行われるようになっていて、車輛が停止状態にあり且つ車輛の加速度 G_{xy} の絶対値が基準値 G_{xy2} （正の定数）以上であるか否かの判別が行われてもよい。

【0058】また上述の実施形態に於いては、各車輪の車輪速度 V_w の和 ΣV_i が0であるか否かにより車速が0であり車輛が停止状態にあるか否かが判別されるようになっていて、車輛が停止状態にあるか否かの判別は車輪速度の和 ΣV_i が基準値 V_0 （0に近い正の定数）以下であるか否かにより行われてもよく、また各車輪の車輪速度 V_w のうちの最大値が基準値 V_{w0} （0に近い正の定数）以下であるか否かにより行われてもよい。

【0059】更に上述の実施形態に於いては、EEPROM54は3つの記憶エリアM1〜M3を有し、LD番号は0〜9の数字よりなっているが、これらの数は任意の数であってよく、またEEPROM54に記録される車輛の走行データを任意のデータであってよい。

【0060】

【発明の効果】以上の説明より明らかである如く、本発明の請求項1の構成によれば、車輛の通常の走行時や停車時に加速度の大きさが比較的大きくなる場合を区別して車輛の異常状態を確実に判定することができ、これにより車輛が異常状態になる直前の走行データを確実に保存することができる。

【0061】また請求項2及び3の構成によれば、車輛の加速度判定の基準値を高く設定する必要がないので、車輛の異常状態を確実に判定することができ、請求項4の構成によれば、車輛の通常の走行時に加速度の大きさが比較的大きくなる状況に於いて車輛の異常状態と判定されることを確実に防止することができる。

【0062】また請求項5の構成によれば、車輛が異常状態になった時点以降のデータが記憶手段に上書きされることを確実に防止し、これにより車輛が異常状態になる直前の走行データが消去されることを確実に防止することができる。

【図面の簡単な説明】

【図1】運動制御装置が搭載された車輛に適用された本発明による車輛用走行データ記録装置の一つの好ましい実施形態を示す概略構成図である。

【図2】図1に示された走行データ記録装置を示すブロック図である。

【図3】走行データ記録装置のEEPROMの記憶エリアを示す説明図である。

【図4】図示の実施形態に於ける走行データの記録制御ルーチンを示すフローチャートである。

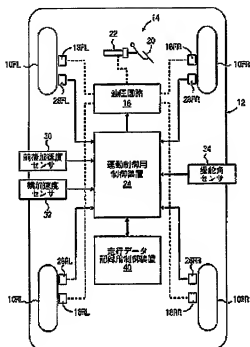
【符号の説明】

10 FR〜10 RL…車輛
14…制動装置
16…油圧回路
24…運動制御用制御装置
28 FR〜28 RL…車輪速度センサ

- 30…前後加速度センサ
32…横加速度センサ
34…操舵角センサ

- * 40…走行データ記録用制御装置
52…マイクロコンピュータ
* 54…EEPROM

【図1】

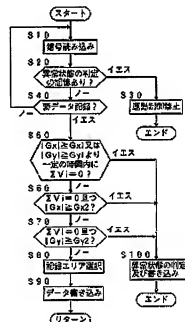
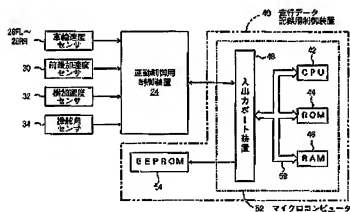


【図3】

54	M1	M2	M3
51	ID番号	ID番号	ID番号
	車輪速度 V_{fl}	車輪速度 V_{fr}	車輪速度 V_{rl}
	車輪速度 V_{fr}	車輪速度 V_{fl}	車輪速度 V_{rl}
	車輪速度 V_{rl}	車輪速度 V_{fl}	車輪速度 V_{fr}
	車輪速度 V_{fl}	車輪速度 V_{fr}	車輪速度 V_{rl}
	前後加速度 G_x	前後加速度 G_x	前後加速度 G_x
	横加速度 G_y	横加速度 G_y	横加速度 G_y
	操舵角 θ	操舵角 θ	操舵角 θ
	スリップ率 R_{slf}	スリップ率 R_{sfr}	スリップ率 R_{srl}
	スリップ率 R_{sfl}	スリップ率 R_{sfr}	スリップ率 R_{srl}
	スリップ率 R_{sfl}	スリップ率 R_{sfr}	スリップ率 R_{srl}
	スリップ率 R_{sfl}	スリップ率 R_{sfr}	スリップ率 R_{srl}
	スリップ率 R_{sfl}	スリップ率 R_{sfr}	スリップ率 R_{srl}
53	特定結果	特定結果	特定結果

【図4】

【図2】



フロントページの続き

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CLAIMS

[Claim(s)]

[Claim 1] A record means to record the transit data of a vehicle, and an abnormal-condition judging means to judge the abnormal condition of a vehicle, An acceleration judging means by which, as for said abnormal-condition judging means, the magnitude of the acceleration of a vehicle judges whether it is beyond a reference value in the data recorder for vehicles which has the control means which controls said record means based on the judgment result of said abnormal-condition judging means, The data recorder for vehicles characterized by having a vehicle speed judging means to judge whether the vehicle speed is below a reference value, and judging the abnormal condition of a vehicle based on the judgment result of said acceleration judging means and said vehicle speed judging means.

[Claim 2] Said abnormal-condition judging means is a data recorder for vehicles according to claim 1 characterized by judging with the abnormal condition of a vehicle when it is judged with the vehicle speed being below a reference value by said vehicle speed judging means within predetermined time amount from the event of being judged with the magnitude of the acceleration of a vehicle being beyond a reference value by said acceleration judging means.

[Claim 3] Said abnormal-condition judging means is a data recorder for vehicles according to claim 1 characterized by judging with the abnormal condition of a vehicle when it is judged with the vehicle speed being below a reference value by said vehicle speed judging means and is judged with the magnitude of the acceleration of a vehicle being beyond a reference value by said acceleration judging means.

[Claim 4] Said vehicle speed judging means is a data recorder for vehicles given in claim 1 thru/or any of 3 they are. [which is characterized by judging with the vehicle speed being below a reference value when the vehicle speed is 0 substantially]

[Claim 5] It is a data recorder for vehicles given in claim 1 thru/or any of 4 record said record means by writing transit data in this storage means by overwrite including a storage means memorize the transit data of a vehicle, and they are. [which is characterized by said control means forbidding record by said record means when the abnormal condition of a vehicle is judged by said abnormal-condition judging means]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the data recorder for vehicles, and relates to the data recorder which records the transit data of a vehicle on a detail further.

[0002]

[Description of the Prior Art] The data recorder constituted so that the transit data of a vehicle might be recorded on a storage means by carrying out sequential overwriting, it might judge with the vehicle having been in the abnormal condition when the magnitude of the acceleration of a vehicle was beyond a reference value and the overwriting to a storage means might be stopped is conventionally known as indicated as one of the data recorders of vehicles, such as an automobile, by JP,7-249137,A concerning application of an applicant for this patent.

[0003] Since it is recorded by carrying out sequential overwriting of the transit data of a vehicle at a storage means according to this data recorder, the large storage means of storage capacity is unnecessary, and since the overwriting to a storage means is stopped when the magnitude of the acceleration of a vehicle becomes beyond a reference value, transit data just before the magnitude of the acceleration of a vehicle becomes beyond a reference value can certainly be saved.

[0004]

[Problem(s) to be Solved by the Invention] However, in the conventional data recorder like ****, since it is judged with the vehicle having been in the abnormal condition when the magnitude of the acceleration of a vehicle is beyond a reference value, even if a vehicle will be in an abnormal condition, the abnormal condition may be unable to be judged. namely, since the acceleration of a vehicle may become a comparatively high value also at the time of usual transit of a vehicle, when the abnormal condition of a vehicle is judged only based on the magnitude of the acceleration of a vehicle the reference value of an abnormal-condition judging -- a comparatively high value -- not setting up -- transit data just before it does not obtain, therefore the abnormal condition will not be judged even if the abnormal condition like the collision of a vehicle arises, therefore a vehicle will be in an abnormal condition may be unable to be saved

[0005] This invention is made in view of the problem like **** in the conventional data recorder constituted so that the overwriting of transit data to a storage means might be stopped, when the magnitude of the acceleration of a vehicle is beyond a reference value, and the main technical problems of this invention are certainly saving transit data just before a vehicle's will be in an abnormal condition by judging that certainly, when a vehicle will be in an abnormal condition.

[0006]

[Means for Solving the Problem] A record means by which main above-mentioned technical problems record the configuration of claim 1, i.e., the transit data of a vehicle, according to this invention, In the data recorder for vehicles which has an abnormal-condition judging means to judge the abnormal condition of a vehicle, and the control means which controls said record means based on the judgment result of said abnormal-condition judging means An acceleration judging means by which, as for said

abnormal-condition judging means, the magnitude of the acceleration of a vehicle judges whether it is beyond a reference value. It has a vehicle speed judging means to judge whether the vehicle speed is below a reference value, and is attained by the data recorder for vehicles characterized by judging the abnormal condition of a vehicle based on the judgment result of said acceleration judging means and said vehicle speed judging means.

[0007] Generally the vehicle speed in case the magnitude of acceleration becomes comparatively large to falling rapidly to a value with the very small vehicle speed while the deceleration of a vehicle will go up rapidly to a collision and coincidence if a vehicle generally collides, and becoming a value with the very large magnitude of acceleration at the time of usual transit of a vehicle is comparatively high. Moreover, when the installation condition of a sensor that the collision of a vehicle etc. detects the acceleration of a vehicle becomes unusual or the vehicle itself will be inclined unusually, a sensor comes to show regularly the very high value which is not shown at the time of the usual transit of a vehicle, and a stop. Therefore, by taking the vehicle speed into consideration in addition to the acceleration of a vehicle, the abnormal condition like the collision of a vehicle can be judged certainly.

[0008] According to the configuration of above-mentioned claim 1, since the abnormal condition of a vehicle is judged based on the judgment result of an acceleration judging means and a vehicle speed judging means, it becomes possible to certainly save transit data just before it will become possible to distinguish the case where the magnitude of acceleration becomes comparatively large at the time of the usual transit of a vehicle, and a stop, and to judge the abnormal condition of a vehicle certainly and a vehicle will be in an abnormal condition by this.

[0009] Moreover, according to this invention, that main above-mentioned technical problems should be attained effectively, in the configuration of above-mentioned claim 1, when it judges that the vehicle speed is below a reference value with said vehicle speed judging means within predetermined time amount from the event of being judged with the magnitude of the acceleration of a vehicle being beyond a reference value by said acceleration judging means, said abnormal-condition judging means is constituted so that it may judge with the abnormal condition of a vehicle (configuration of claim 2).

[0010] Since according to the configuration of claim 2 it is judged with the abnormal condition of a vehicle when it is judged with the vehicle speed being below a reference value by the vehicle speed judging means within predetermined time amount from the event of being judged with the magnitude of the acceleration of a vehicle being beyond a reference value by the acceleration judging means, it is not necessary to make the reference value of an acceleration judging of a vehicle high, and, thereby, the abnormal condition of a vehicle is judged certainly.

[0011] Moreover, according to this invention, that main above-mentioned technical problems should be attained effectively, in the configuration of above-mentioned claim 1, when it is judged with the vehicle speed being below a reference value by said vehicle speed judging means and judges that the magnitude of the acceleration of a vehicle is beyond a reference value with said acceleration judging means, said abnormal-condition judging means is constituted so that it may judge with the abnormal condition of a vehicle (configuration of claim 3).

[0012] Since according to the configuration of claim 3 it is judged with the abnormal condition of a vehicle when it is judged with the vehicle speed being below a reference value by the vehicle speed judging means and is judged with the magnitude of the acceleration of a vehicle being beyond a reference value by the acceleration judging means, it is not necessary to make the reference value of an acceleration judging of a vehicle high, and, thereby, the abnormal condition of a vehicle is judged certainly.

[0013] Moreover, according to this invention, that main above-mentioned technical problems should be attained effectively, in above-mentioned claim 1 thru/or which configuration of 3, when the vehicle speed is 0 substantially, said vehicle speed judging means is constituted so that it may judge with the vehicle speed being below a reference value (configuration of claim 4).

[0014] Since according to the configuration of claim 4 it is judged with the vehicle speed being below a reference value when the vehicle speed is 0 substantially, being judged with the abnormal condition of a vehicle in the situation that the magnitude of acceleration becomes comparatively large at the time of

usual transit of a vehicle is prevented certainly.

[0015] Moreover, according to this invention, it sets in above-mentioned claim 1 thru/or which configuration of 4 that main above-mentioned technical problems should be attained effectively. Said record means is recorded by writing transit data in this storage means by overwrite including a storage means to memorize the transit data of a vehicle. When the abnormal condition of a vehicle is judged by said abnormal-condition judging means, said control means is constituted so that record by said record means may be forbidden (configuration of claim 5).

[0016] According to the configuration of claim 5, when the abnormal condition of a vehicle is judged by the abnormal-condition judging means, record by the record means is forbidden, and it is prevented certainly that the data after the event of a vehicle being in an abnormal condition by this are overwritten by the storage means and that transit data if it puts in another way, just before a vehicle will be in an abnormal condition are eliminated.

[0017]

[The desirable mode of a technical-problem solution means] According to one desirable mode of this invention, it is constituted in the configuration of above-mentioned claim 1 so that it may have a record judging means judge whether a record means should record the transit data of a vehicle, a storage means memorize transit data, and the means that write in in transit data to a storage means when the judgment of the purport which should record transit data with a record judging means is performed (a desirable mode 1).

[0018] other one desirable voice of this invention -- if it depends like -- the above -- in the configuration of the desirable mode 1, it is constituted so that it may judge whether a record judging means should record the transit data of a vehicle for every predetermined time amount (desirable mode 2).

[0019] According to other one desirable mode of this invention, in the configuration of above-mentioned claim 1, a vehicle has kinematic-control equipment which performs kinematic control for motion stabilization of the vehicle at the time of transit, and when kinematic control is performed by kinematic-control equipment, a record judging means is constituted so that the purport which should record transit data may be judged (desirable mode 3).

[0020] In the configuration of above-mentioned claim 1, including a means to detect the lateral acceleration of a vehicle, when the magnitude of the lateral acceleration of a vehicle is beyond a reference value, according to other one desirable mode of this invention, a record judging means is constituted so that the purport which should record transit data may be judged (desirable mode 4).

[0021] According to other one desirable mode of this invention, it sets in the configuration of above-mentioned claim 2. It judges whether it is beyond the reference value with which the magnitude of the lateral acceleration of a vehicle corresponds while judging whether an acceleration judging means is beyond a reference value with which the magnitude of vehicle order acceleration corresponds. From the event of being judged with it being beyond the reference value with which the magnitude of the lateral acceleration of the event of being judged with it being beyond the reference value to which the magnitude of vehicle order acceleration corresponds with an acceleration judging means, or a vehicle corresponds, within predetermined time amount with a vehicle speed judging means When judged with the vehicle speed being below a reference value, it is constituted so that it may judge with the abnormal condition of a vehicle (desirable mode 5).

[0022] According to other one desirable mode of this invention, it sets in the configuration of above-mentioned claim 3. It judges whether it is beyond the reference value with which the magnitude of the lateral acceleration of a vehicle corresponds while judging whether an acceleration judging means is beyond a reference value with which the magnitude of vehicle order acceleration corresponds. It is judged with the vehicle speed being below a reference value by the vehicle speed judging means. With an acceleration judging means When judged with it being beyond the reference value with which the magnitude of vehicle order acceleration corresponds Or when judged with it being beyond the reference value to which it is judged with the vehicle speed being below a reference value by the vehicle speed judging means, and the magnitude of the lateral acceleration of a vehicle corresponds with an acceleration judging means, it is constituted so that it may judge with the abnormal condition of a

vehicle (desirable mode 6).

[0023] According to other one desirable mode of this invention, in the configuration of above-mentioned claim 5, a storage means has two or more storage areas, and it is constituted so that transit data may be written in the storage area which has memorized the oldest transit data by overwrite (desirable mode 7).
[0024]

[Embodiment of the Invention] This invention is explained to a detail about a desirable operation gestalt, referring to drawing of attachment in the following.

[0025] The outline block diagram showing one desirable operation gestalt of the transit data recorder for vehicles by this invention by which drawing 1 was applied to the vehicle with which kinematic-control equipment was carried, and drawing 2 are the block diagrams showing the transit data recorder shown in drawing 1.

[0026] In drawing 1, 10floor line and 10FR show the front wheel of right and left of a vehicle 12, respectively, and 10RL and 10RR(s) show the rear wheel of right and left of a vehicle, respectively. The damping force of each wheel is controlled by controlling the braking pressure of wheel-cylinder 18FR, 18floor line, 18RR, and 18RL by the hydraulic circuit 16 of a damping device 14. Although not shown in drawing, sometimes, a hydraulic circuit 16 is usually controlled for the braking pressure of each wheel cylinder by the control unit 24 for kinematic control according to the pressure in the master cylinder 22 driven by treading-in actuation of the brake pedal 20 by the operator including an oil reservoir, a lubricating oil pump, various valve gears, etc.

[0027] Sensor 28FR, 28floor line, 28RR, and 28RL are prepared in the location close to wheel 10FR-10RL whenever [wheel speed / which detects V_i ($i=fr, fl, rr, rl$) whenever / wheel speed / of each wheel / , respectively]. Moreover, the acceleration sensor 30 before and after detecting the car-body order acceleration G_x , respectively, the lateral acceleration sensor 32 which detects lateral acceleration G_y , and the steering angle sensor 34 which detects the steering angle θ are formed in the vehicle 12. The signal which shows the value detected by each sensor is inputted into the control device 24 for kinematic control, and is inputted into the control device 40 for transit data logging through the control device 24 for kinematic control.

[0028] If the braking slip ratio R_s of each wheel is calculated based on V_i whenever [wheel speed / which was detected by sensor 28FR-28RL whenever / wheel speed] and the braking slip ratio R_s becomes beyond a reference value R_{so} (forward constant), the control unit 24 for kinematic control will start the antiskid control which fluctuates damping force so that the braking slip ratio R_s of the wheel concerned may become within the limits of predetermined, and if the terminating condition set up beforehand is satisfied, it will end an antiskid control.

[0029] In this way, although the control unit 24 for kinematic control constitutes the kinematic-control equipment which raises the stability at the time of transit of a vehicle by having two incomes with a damping device 14, and rationalizing a braking slip of a wheel when there is a possibility that a braking slip of a wheel may become superfluous and the motion at the time of transit of a vehicle may become instability. An input of the signal of the purport which forbids the kinematic control of a vehicle from the control device 40 for transit data logging like the after-mentioned does not perform kinematic control (antiskid control).

[0030] In addition, the antiskid control as kinematic control performed by the control device 24 for kinematic control does not make the summary of this invention, and may be performed in the way of well-known arbitration in this technical field. Moreover, in addition to an antiskid control, the control device 24 for kinematic control performs other kinematic control like the traction control by control of damping force, or behavior stabilization control.

[0031] The control unit 40 for transit data logging contains EEPROM54 which is the memory of a non-volatile as external storage, including the microcomputer 52 of a general configuration of that have CPU42, ROM44 and RAM46, and input/output port equipment 48, and these were mutually connected by the common bus 50 of bidirection as shown in drawing 2.

[0032] The control unit 40 for transit data logging judges periodically whether the quantity of state detected by each sensor based on the information on lateral acceleration G_y or the control unit 24 for

kinematic control like the after-mentioned, i.e., the transit data of a vehicle, should be recorded, and when the judgment of the purport which should record transit data is performed, it records transit data on EEPROM54.

[0033] Furthermore, the control unit 40 for transit data logging judges whether based on V_i , the after acceleration G_x , and lateral acceleration G_y , the vehicle would be in the abnormal condition like the after-mentioned whenever [wheel speed], when the judgment of the purport from which the vehicle is not an abnormal condition is performed, record of transit data is permitted, but when the judgment of the purport that the vehicle would be in the abnormal condition is performed, it forbids that the transit data after it should be recorded by overwrite.

[0034] The section S1 where EEPROM44 has three storage areas M1-M3 in the operation gestalt of a graphic display in as shown in drawing 3, and each storage area memorizes the ID number as identification information about record timing, respectively, Whenever [wheel speed] V_{fr} , V_{fl} , V_{rr} , V_{rl} , the order acceleration G_x , lateral acceleration G_y , It has the section S2 which memorizes each transit data of braking slip ratio R_{sfr} of the steering angle θ , a right front wheel, a left front wheel, a right rear wheel, and a left rear wheel, R_{sfl} , R_{srr} , and R_{srl} , and the section S3 which memorizes the judgment result of whether the vehicle would be in the abnormal condition.

[0035] An ID number consists of a figure of 0-9, in order of [0] record of data, is used to 9 in order, and is repeatedly returned and used for the degree of 9 by 0. Moreover, record of data is storage areas M1, M2, M3, M1, and M2. -- It is repeatedly carried out by overwrite in order. Therefore, it can judge whether which data are the newest data and are data with which oldest data by the ID number recorded on the section S1 of storage areas M1-M3.

[0036] Although not shown in **** at a detail, the control unit 24 for kinematic control also has CPU, ROM and RAM, and input/output port equipment, and these contain the microcomputer of a general configuration of having connected mutually with the common bus of bidirection.

[0037] Next, with reference to the flow chart shown in drawing 4, record control of the transit data of the vehicle in the operation gestalt of a graphic display is explained. In addition, closing of the ignition switch which is not shown in drawing begins, and control by the flow chart shown in drawing 4 is repeatedly performed for every predetermined time amount.

[0038] While the signal which shows V_i whenever [wheel speed / which was first detected by sensor 28FR-28RL whenever / wheel speed / in step 10] is read through the control unit 24 for kinematic control, the signal which shows whether the antiskid control as kinematic control is performed from the control unit 24 for kinematic control is read. The signal which shows the detection value of a **** sensor may be directly read from a corresponding sensor, respectively.

[0039] When record control of transit data is completed and negative distinction is performed after the signal of the purport which should forbid kinematic control to the control device 24 for kinematic control in step 30 was outputted, when distinction of whether the information which shows that the vehicle would be in the abnormal condition into the section S3 of which storage area in step 20 is memorized was performed and affirmation distinction was performed, it progresses to step 40.

[0040] When distinction of whether the transit data of a vehicle need to be recorded is performed in step 40, negative distinction is performed and return and affirmation distinction are performed to step 10, it progresses to step 50.

[0041] In addition, distinction of whether transit data need to be recorded For example, it is carried out by distinction of whether kinematic control (an antiskid control or other kinematic control) by distinction of whether the absolute value of the lateral acceleration G_y of a vehicle is beyond the reference value G_{yo} (forward constant) and the control device 24 for kinematic control is performed. When distinction of a purport to which kinematic control by the distinction of a purport or the control device 24 for kinematic control whose absolute value of lateral acceleration G_y is beyond the reference value G_{yo} is performed is performed, it may be judged with transit data needing to be recorded.

[0042] While sum σV_i of V_i calculates whenever [wheel speed / of each wheel] in step 50 Distinction of whether sum σV_i of whenever [wheel speed] was set to 0 from the event of the absolute value of the condition that the absolute value of the order acceleration G_x is more than

reference-value $Gx1$ (forward constant), or lateral acceleration Gy being in the condition of being more than reference-value $Gy1$ (forward constant) within the predetermined time amount Tc (forward constant), That is, after the magnitude of vehicle order acceleration or lateral acceleration becomes a very high value, distinction of whether the vehicle stopped progresses to step 100, when a line crack and affirmation distinction are performed, and when negative distinction is performed, it progresses to step 60.

[0043] In addition, the reference values $Gx1$ and $Gy1$ of the distinction in step 50 are set as the comparatively large value which is not produced at the time of the usual transit of a vehicle (the transit in usual acceleration and deceleration, a usual slope, etc. is included), respectively.

[0044] Distinction of whether in step 60, sum σVi of Vi is 0 whenever [wheel speed / of each wheel], and the absolute value of the vehicle order acceleration Gx is more than reference-value $Gx2$ (forward constant), That is, when distinction of whether the magnitude of the vehicle order acceleration with which a vehicle is in a idle state, and is detected is a very high value is performed and affirmation distinction is performed, it progresses to step 100, and when negative distinction is performed, it progresses to step 70.

[0045] Distinction of whether in step 70, sum σVi of Vi is 0 whenever [wheel speed / of each wheel], and the absolute value of the lateral acceleration Gy of a vehicle is more than reference-value $Gy2$ (forward constant), That is, when distinction of whether the magnitude of the lateral acceleration of the vehicle with which a vehicle is in a idle state, and is detected is a very high value is performed and affirmation distinction is performed, it progresses to step 100, and when negative distinction is performed, it progresses to step 80.

[0046] In addition, the reference values $Gx2$ and $Gy2$ of the distinction in steps 60 and 70 are set as the comparatively large value which is not produced in the usual stop condition (the stop in a slope etc. is included) of a vehicle, respectively.

[0047] It is chosen as record area for the storage area in which the oldest data are written among the storage areas M1-M3 of EEPROM44 in step 80 to record these data, is written in the record area where the transit data of the vehicle read in the present cycle in step 90 were chosen in step 80 by overwrite, and returns to step 10 after an appropriate time.

[0048] It is written in the section S3 of the record area as which the information on the purport which has a vehicle in the abnormal condition like a collision while the area where the judgment of the purport which has a vehicle in the abnormal condition like a collision in step 100 was performed, and transit data were recorded last time among storage areas M1-M3 is chosen as record area was chosen, and returns to step 10 after an appropriate time.

[0049] According to the operation gestalt of a graphic display, distinction of whether in step 20, the vehicle is an abnormal condition like the condition after accident is performed in this way. Since affirmation distinction is performed in step 20 and the kinematic control by the control unit 24 for kinematic control is forbidden in step 30 when the vehicle is an abnormal condition It can prevent certainly that unsuitable kinematic control is performed based on the unusual quantity of state detected by the sensor of an unusual condition.

[0050] Moreover, when a vehicle is in a normal condition, negative distinction is performed in step 20 and distinction of whether the transit data of a vehicle need to be recorded is performed in step 40. By performing negative distinction in step 40, when a vehicle is in the usual run state Although record of transit data is not performed, in the situation as [whose magnitude of the lateral acceleration of a vehicle is a very high value], affirmation distinction is performed in step 40. Unless distinction of the purport from which the vehicle is in the unusual condition in steps 50-70 is performed, transit data are recorded in steps 80 and 90.

[0051] On the other hand, when the vehicle is in the unusual condition, while setting they to be [any of steps 50-70], performing affirmation distinction and performing the judgment of an abnormal condition in step 100, the information is recorded, and, thereby, record of the transit data based on the overwrite to EEPROM44 is forbidden.

[0052] Therefore, if a vehicle will be in an abnormal condition by collision etc., since record of the

transit data which record of the transit data after it is not performed, but are memorized by EEPROM44 by then will be maintained, transit data just before a vehicle will be in an abnormal condition can certainly be saved.

[0053] Especially distinction of whether according to the operation gestalt of a graphic display, the vehicle is in the unusual condition is performed by steps 50-70. Since distinction of whether the vehicle would be in the idle state is performed within the predetermined time amount T_c from the event of the absolute value of the condition that the absolute values of the order acceleration G_x are one or more reference values G_x , or lateral acceleration G_y being in the condition of being one or more reference values G_y , in step 50 After the magnitude of acceleration becomes very large by the collision of a vehicle etc., the unusual condition that the vehicle stopped can be judged certainly.

[0054] Moreover, since a vehicle is in a idle state, respectively, distinction and the vehicle of whether the absolute values of the vehicle order acceleration G_x are two or more reference values G_x are in a idle state in steps 60 and 70 and distinction of whether the absolute values of the lateral acceleration G_y of a vehicle are two or more reference values G_y is performed An abnormal condition toward which the installation condition of the order acceleration sensor 30 or the lateral acceleration sensor 32 became unusual by the collision of a vehicle etc., or the vehicle itself inclined unusually can be judged certainly. [0055] Although this invention was explained above about the specific operation gestalt at the detail, probably this invention will not be limited to an above-mentioned operation gestalt, and it will be clear for this contractor its for other various operation gestalten to be possible within the limits of this invention.

[0056] For example, it sets in an above-mentioned operation gestalt. Although distinction of whether the vehicle would be in the idle state is performed within the predetermined time amount T_c from the event of the absolute value of the condition that the absolute values of the order acceleration G_x are one or more reference values G_x , or lateral acceleration G_y being in the condition of being one or more reference values G_y , in step 50 The acceleration G_{xy} of a vehicle calculates as a square root ($G_x^2 + G_y^2$) ($1/2$) of the sum of the square of the order acceleration G_x , and the square of lateral acceleration G_y . Distinction of whether the vehicle would be in the idle state may be performed within the predetermined time amount T_c from the event of the absolute value of the acceleration G_{xy} of a vehicle being in the condition of being more than reference-value G_{xy1} (forward constant).

[0057] It sets in an above-mentioned operation gestalt similarly. Step 60 And although a vehicle is in a idle state in 70, respectively, distinction and the vehicle of whether the absolute values of the vehicle order acceleration G_x are two or more reference values G_x are in a idle state and distinction of whether the absolute values of the lateral acceleration G_y of a vehicle are two or more reference values G_y is performed A vehicle is in a idle state and distinction of whether the absolute value of the acceleration G_{xy} of a vehicle is more than reference-value G_{xy2} (forward constant) may be performed.

[0058] Moreover, although it is distinguished whether the vehicle speed is 0 and a vehicle is in a idle state in an above-mentioned operation gestalt by whether sum σV_i of V_i is 0 whenever [wheel speed / of each wheel] Distinction of whether a vehicle is in a idle state may be performed by whether sum σV_i of whenever [wheel speed] is below the reference value V_0 (forward constant near 0), and may be performed by whether the maximum of the $V_i(s)$ is below the reference value V_{w0} (forward constant near 0) whenever [wheel speed / of each wheel].

[0059] Furthermore, in an above-mentioned operation gestalt, although EEPROM54 has three storage areas M1-M3 and the ID number consists of a figure of 0-9, these numbers may be the number of arbitration, and the transit data of the vehicle recorded on EEPROM54 may also be data of arbitration.

[0060]

[Effect of the Invention] According to the configuration of claim 1 of this invention, the case where the magnitude of acceleration becomes comparatively large at the time of the usual transit of a vehicle and a stop can be distinguished, the abnormal condition of a vehicle can be judged certainly, and transit data just before a vehicle will be in an abnormal condition by this can certainly be saved so that more clearly than the above explanation.

[0061] Moreover, since it is not necessary to set up the reference value of an acceleration judging of a

vehicle highly according to the configuration of claims 2 and 3, the abnormal condition of a vehicle can be judged certainly, and according to the configuration of claim 4, it can prevent certainly being judged with the abnormal condition of a vehicle in the situation that the magnitude of acceleration becomes comparatively large at the time of usual transit of a vehicle.

[0062] Moreover, according to the configuration of claim 5, it can prevent certainly that the data after the event of a vehicle being in an abnormal condition are overwritten by the storage means, and can prevent certainly that transit data just before a vehicle will be in an abnormal condition by this are eliminated.

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PRIOR ART

[Description of the Prior Art] The data recorder constituted so that the transit data of a vehicle might be recorded on a storage means by carrying out sequential overwriting, it might judge with the vehicle having been in the abnormal condition when the magnitude of the acceleration of a vehicle was beyond a reference value and the overwriting to a storage means might be stopped is conventionally known as indicated as one of the data recorders of vehicles, such as an automobile, by JP,7-249137,A concerning application of an applicant for this patent.

[0003] Since it is recorded by carrying out sequential overwriting of the transit data of a vehicle at a storage means according to this data recorder, the large storage means of storage capacity is unnecessary, and since the overwriting to a storage means is stopped when the magnitude of the acceleration of a vehicle becomes beyond a reference value, transit data just before the magnitude of the acceleration of a vehicle becomes beyond a reference value can certainly be saved.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to the configuration of claim 1 of this invention, the case where the magnitude of acceleration becomes comparatively large at the time of the usual transit of a vehicle and a stop can be distinguished, the abnormal condition of a vehicle can be judged certainly, and transit data just before a vehicle will be in an abnormal condition by this can certainly be saved so that more clearly than the above explanation.

[0061] Moreover, since it is not necessary to set up the reference value of an acceleration judging of a vehicle highly according to the configuration of claims 2 and 3, the abnormal condition of a vehicle can be judged certainly, and according to the configuration of claim 4, it can prevent certainly being judged with the abnormal condition of a vehicle in the situation that the magnitude of acceleration becomes comparatively large at the time of usual transit of a vehicle.

[0062] Moreover, according to the configuration of claim 5, it can prevent certainly that the data after the event of a vehicle being in an abnormal condition are overwritten by the storage means, and can prevent certainly that transit data just before a vehicle will be in an abnormal condition by this are eliminated.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the conventional data recorder like ****, since it is judged with the vehicle having been in the abnormal condition when the magnitude of the acceleration of a vehicle is beyond a reference value, even if a vehicle will be in an abnormal condition, the abnormal condition may be unable to be judged. namely, since the acceleration of a vehicle may become a comparatively high value also at the time of usual transit of a vehicle, when the abnormal condition of a vehicle is judged only based on the magnitude of the acceleration of a vehicle the reference value of an abnormal-condition judging -- a comparatively high value -- not setting up -- transit data just before it does not obtain, therefore the abnormal condition will not be judged even if the abnormal condition like the collision of a vehicle arises, therefore a vehicle will be in an abnormal condition may be unable to be saved

[0005] This invention is made in view of the problem like **** in the conventional data recorder constituted so that the overwriting of transit data to a storage means might be stopped, when the magnitude of the acceleration of a vehicle is beyond a reference value, and the main technical problems of this invention are certainly saving transit data just before a vehicle's will be in an abnormal condition by judging that certainly, when a vehicle will be in an abnormal condition.

[Translation done.]

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MEANS

[Means for Solving the Problem] A record means by which main above-mentioned technical problems record the configuration of claim 1, i.e., the transit data of a vehicle, according to this invention. In the data recorder for vehicles which has an abnormal-condition judging means to judge the abnormal condition of a vehicle, and the control means which controls said record means based on the judgment result of said abnormal-condition judging means An acceleration judging means by which, as for said abnormal-condition judging means, the magnitude of the acceleration of a vehicle judges whether it is beyond a reference value. It has a vehicle speed judging means to judge whether the vehicle speed is below a reference value, and is attained by the data recorder for vehicles characterized by judging the abnormal condition of a vehicle based on the judgment result of said acceleration judging means and said vehicle speed judging means.

[0007] Generally the vehicle speed in case the magnitude of acceleration becomes comparatively large to falling rapidly to a value with the very small vehicle speed while the deceleration of a vehicle will go up rapidly to a collision and coincidence if a vehicle generally collides, and becoming a value with the very large magnitude of acceleration at the time of usual transit of a vehicle is comparatively high. Moreover, when the installation condition of a sensor that the collision of a vehicle etc. detects the acceleration of a vehicle becomes unusual or the vehicle itself will be inclined unusually, a sensor comes to show regularly the very high value which is not shown at the time of the usual transit of a vehicle, and a stop. Therefore, by taking the vehicle speed into consideration in addition to the acceleration of a vehicle, the abnormal condition like the collision of a vehicle can be judged certainly.

[0008] According to the configuration of above-mentioned claim 1, since the abnormal condition of a vehicle is judged based on the judgment result of an acceleration judging means and a vehicle speed judging means, it becomes possible to certainly save transit data just before it will become possible to distinguish the case where the magnitude of acceleration becomes comparatively large at the time of the usual transit of a vehicle, and a stop, and to judge the abnormal condition of a vehicle certainly and a vehicle will be in an abnormal condition by this.

[0009] Moreover, according to this invention, that main above-mentioned technical problems should be attained effectively, in the configuration of above-mentioned claim 1, when it judges that the vehicle speed is below a reference value with said vehicle speed judging means within predetermined time amount from the event of being judged with the magnitude of the acceleration of a vehicle being beyond a reference value by said acceleration judging means, said abnormal-condition judging means is constituted so that it may judge with the abnormal condition of a vehicle (configuration of claim 2).

[0010] Since according to the configuration of claim 2 it is judged with the abnormal condition of a vehicle when it is judged with the vehicle speed being below a reference value by the vehicle speed judging means within predetermined time amount from the event of being judged with the magnitude of the acceleration of a vehicle being beyond a reference value by the acceleration judging means, it is not necessary to make the reference value of an acceleration judging of a vehicle high, and, thereby, the abnormal condition of a vehicle is judged certainly.

[0011] Moreover, according to this invention, that main above-mentioned technical problems should be

attained effectively, in the configuration of above-mentioned claim 1, when it is judged with the vehicle speed being below a reference value by said vehicle speed judging means and judges that the magnitude of the acceleration of a vehicle is beyond a reference value with said acceleration judging means, said abnormal-condition judging means is constituted so that it may judge with the abnormal condition of a vehicle (configuration of claim 3).

[0012] Since according to the configuration of claim 3 it is judged with the abnormal condition of a vehicle when it is judged with the vehicle speed being below a reference value by the vehicle speed judging means and is judged with the magnitude of the acceleration of a vehicle being beyond a reference value by the acceleration judging means, it is not necessary to make the reference value of an acceleration judging of a vehicle high, and, thereby, the abnormal condition of a vehicle is judged certainly.

[0013] Moreover, according to this invention, that main above-mentioned technical problems should be attained effectively, in above-mentioned claim 1 thru/or which configuration of 3, when the vehicle speed is 0 substantially, said vehicle speed judging means is constituted so that it may judge with the vehicle speed being below a reference value (configuration of claim 4).

[0014] Since according to the configuration of claim 4 it is judged with the vehicle speed being below a reference value when the vehicle speed is 0 substantially, being judged with the abnormal condition of a vehicle in the situation that the magnitude of acceleration becomes comparatively large at the time of usual transit of a vehicle is prevented certainly.

[0015] Moreover, according to this invention, it sets in above-mentioned claim 1 thru/or which configuration of 4 that main above-mentioned technical problems should be attained effectively. Said record means is recorded by writing transit data in this storage means by overwrite including a storage means to memorize the transit data of a vehicle. When the abnormal condition of a vehicle is judged by said abnormal-condition judging means, said control means is constituted so that record by said record means may be forbidden (configuration of claim 5).

[0016] According to the configuration of claim 5, when the abnormal condition of a vehicle is judged by the abnormal-condition judging means, record by the record means is forbidden, and it is prevented certainly that the data after the event of a vehicle being in an abnormal condition by this are overwritten by the storage means and that transit data if it puts in another way, just before a vehicle will be in an abnormal condition are eliminated.

[0017]

[The desirable mode of a technical-problem solution means] According to one desirable mode of this invention, it is constituted in the configuration of above-mentioned claim 1 so that it may have a record judging means judge whether a record means should record the transit data of a vehicle, a storage means memorize transit data, and the means that write in transit data to a storage means when the judgment of the purport which should record transit data with a record judging means is performed (a desirable mode 1).

[0018] other one desirable voice of this invention -- if it depends like -- the above -- in the configuration of the desirable mode 1, it is constituted so that it may judge whether a record judging means should record the transit data of a vehicle for every predetermined time amount (desirable mode 2).

[0019] According to other one desirable mode of this invention, in the configuration of above-mentioned claim 1, a vehicle has kinematic-control equipment which performs kinematic control for motion stabilization of the vehicle at the time of transit, and when kinematic control is performed by kinematic-control equipment, a record judging means is constituted so that the purport which should record transit data may be judged (desirable mode 3).

[0020] In the configuration of above-mentioned claim 1, including a means to detect the lateral acceleration of a vehicle, when the magnitude of the lateral acceleration of a vehicle is beyond a reference value, according to other one desirable mode of this invention, a record judging means is constituted so that the purport which should record transit data may be judged (desirable mode 4).

[0021] According to other one desirable mode of this invention, it sets in the configuration of above-mentioned claim 2. It judges whether it is beyond the reference value with which the magnitude of the

lateral acceleration of a vehicle corresponds while judging whether an acceleration judging means is beyond a reference value with which the magnitude of vehicle order acceleration corresponds. From the event of being judged with it being beyond the reference value with which the magnitude of the lateral acceleration of the event of being judged with it being beyond the reference value to which the magnitude of vehicle order acceleration corresponds with an acceleration judging means, or a vehicle corresponds, within predetermined time amount with a vehicle speed judging means When judged with the vehicle speed being below a reference value, it is constituted so that it may judge with the abnormal condition of a vehicle (desirable mode 5).

[0022] According to other one desirable mode of this invention, it sets in the configuration of above-mentioned claim 3. It judges whether it is beyond the reference value with which the magnitude of the lateral acceleration of a vehicle corresponds while judging whether an acceleration judging means is beyond a reference value with which the magnitude of vehicle order acceleration corresponds. It is judged with the vehicle speed being below a reference value by the vehicle speed judging means. With an acceleration judging means When judged with it being beyond the reference value with which the magnitude of vehicle order acceleration corresponds Or when judged with it being beyond the reference value to which it is judged with the vehicle speed being below a reference value by the vehicle speed judging means, and the magnitude of the lateral acceleration of a vehicle corresponds with an acceleration judging means, it is constituted so that it may judge with the abnormal condition of a vehicle (desirable mode 6).

[0023] According to other one desirable mode of this invention, in the configuration of above-mentioned claim 5, a storage means has two or more storage areas, and it is constituted so that transit data may be written in the storage area which has memorized the oldest transit data by overwrite (desirable mode 7).

[0024]

[Embodiment of the Invention] This invention is explained to a detail about a desirable operation gestalt, referring to drawing of attachment in the following.

[0025] The outline block diagram showing one desirable operation gestalt of the transit data recorder for vehicles by this invention by which drawing 1 was applied to the vehicle with which kinematic-control equipment was carried, and drawing 2 are the block diagrams showing the transit data recorder shown in drawing 1.

[0026] In drawing 1, 10floor line and 10FR show the front wheel of right and left of a vehicle 12, respectively, and 10RL and 10RR(s) show the rear wheel of right and left of a vehicle, respectively. The damping force of each wheel is controlled by controlling the braking pressure of wheel-cylinder 18FR, 18floor line, 18RR, and 18RL by the hydraulic circuit 16 of a damping device 14. Although not shown in drawing, sometimes, a hydraulic circuit 16 is usually controlled for the braking pressure of each wheel cylinder by the control unit 24 for kinematic control according to the pressure in the master cylinder 22 driven by treading-in actuation of the brake pedal 20 by the operator including an oil reservoir, a lubricating oil pump, various valve gears, etc.

[0027] Sensor 28FR, 28floor line, 28RR, and 28RL are prepared in the location close to wheel 10FR-10RL whenever [wheel speed / which detects V_i ($i=fr, fl, rr, rl$) whenever / wheel speed / of each wheel /, respectively]. Moreover, the acceleration sensor 30 before and after detecting the car-body order acceleration G_x , respectively, the lateral acceleration sensor 32 which detects lateral acceleration G_y , and the steering angle sensor 34 which detects the steering angle θ are formed in the vehicle 12. The signal which shows the value detected by each sensor is inputted into the control device 24 for kinematic control, and is inputted into the control device 40 for transit data logging through the control device 24 for kinematic control.

[0028] If the braking slip ratio R_s of each wheel is calculated based on V_i whenever [wheel speed / which was detected by sensor 28FR-28RL whenever / wheel speed] and the braking slip ratio R_s becomes beyond a reference value R_{so} (forward constant), the control unit 24 for kinematic control will start the antiskid control which fluctuates damping force so that the braking slip ratio R_s of the wheel concerned may become within the limits of predetermined, and if the terminating condition set up beforehand is satisfied, it will end an antiskid control.

[0029] In this way, although the control unit 24 for kinematic control constitutes the kinematic-control equipment which raises the stability at the time of transit of a vehicle by having two incomes with a damping device 14, and rationalizing a braking slip of a wheel when there is a possibility that a braking slip of a wheel may become superfluous and the motion at the time of transit of a vehicle may become instability. An input of the signal of the purport which forbids the kinematic control of a vehicle from the control device 40 for transit data logging like the after-mentioned does not perform kinematic control (antiskid control).

[0030] In addition, the antiskid control as kinematic control performed by the control device 24 for kinematic control does not make the summary of this invention, and may be performed in the way of well-known arbitration in this technical field. Moreover, in addition to an antiskid control, the control device 24 for kinematic control performs other kinematic control like the traction control by control of damping force, or behavior stabilization control.

[0031] The control unit 40 for transit data logging contains EEPROM54 which is the memory of a non-volatile as external storage, including the microcomputer 52 of a general configuration of that have CPU42, ROM44 and RAM46, and input/output port equipment 48, and these were mutually connected by the common bus 50 of bidirection as shown in drawing 2.

[0032] The control unit 40 for transit data logging judges periodically whether the quantity of state detected by each sensor based on the information on lateral acceleration Gy or the control unit 24 for kinematic control like the after-mentioned, i.e., the transit data of a vehicle, should be recorded, and when the judgment of the purport which should record transit data is performed, it records transit data on EEPROM54.

[0033] Furthermore, the control unit 40 for transit data logging judges whether based on Vi, the after acceleration Gx, and lateral acceleration Gy, the vehicle would be in the abnormal condition like the after-mentioned whenever [wheel speed], when the judgment of the purport from which the vehicle is not an abnormal condition is performed, record of transit data is permitted, but when the judgment of the purport that the vehicle would be in the abnormal condition is performed, it forbids that the transit data after it should be recorded by overwrite.

[0034] The section S1 where EEPROM44 has three storage areas M1-M3 in the operation gestalt of a graphic display in as shown in drawing 3, and each storage area memorizes the ID number as identification information about record timing, respectively. Whenever [wheel speed] Vf, Vfl, Vrr, Vrl, the order acceleration Gx, lateral acceleration Gy, It has the section S2 which memorizes each transit data of braking slip ratio Rsrf of the steering angle theta, a right front wheel, a left front wheel, a right rear wheel, and a left rear wheel, Rsfl, Rsr, and Rsl, and the section S3 which memorizes the judgment result of whether the vehicle would be in the abnormal condition.

[0035] An ID number consists of a figure of 0-9, in order of [0] record of data, is used to 9 in order, and is repeatedly returned and used for the degree of 9 by 0. Moreover, record of data is storage areas M1, M2, M3, M1, and M2. -- It is repeatedly carried out by overwrite in order. Therefore, it can judge whether which data are the newest data and are data with which oldest data by the ID number recorded on the section S1 of storage areas M1-M3.

[0036] Although not shown in **** at a detail, the control unit 24 for kinematic control also has CPU, ROM and RAM, and input/output port equipment, and these contain the microcomputer of a general configuration of having connected mutually with the common bus of bidirection.

[0037] Next, with reference to the flow chart shown in drawing 4, record control of the transit data of the vehicle in the operation gestalt of a graphic display is explained. In addition, closing of the ignition switch which is not shown in drawing begins, and control by the flow chart shown in drawing 4 is repeatedly performed for every predetermined time amount.

[0038] While the signal which shows Vi whenever [wheel speed / which was first detected by sensor 28FR-28RL whenever / wheel speed / in step 10] is read through the control unit 24 for kinematic control, the signal which shows whether the antiskid control as kinematic control is performed from the control unit 24 for kinematic control is read. The signal which shows the detection value of a **** sensor may be directly read from a corresponding sensor, respectively.

[0039] When record control of transit data is completed and negative distinction is performed after the signal of the purport which should forbid kinematic control to the control device 24 for kinematic control in step 30 was outputted, when distinction of whether the information which shows that the vehicle would be in the abnormal condition into the section S3 of which storage area in step 20 is memorized was performed and affirmation distinction was performed, it progresses to step 40.

[0040] When distinction of whether the transit data of a vehicle need to be recorded is performed in step 40, negative distinction is performed and return and affirmation distinction are performed to step 10, it progresses to step 50.

[0041] In addition, distinction of whether transit data need to be recorded For example, it is carried out by distinction of whether kinematic control (an antiskid control or other kinematic control) by distinction of whether the absolute value of the lateral acceleration G_y of a vehicle is beyond the reference value G_{y0} (forward constant) and the control device 24 for kinematic control is performed. When distinction of a purport to which kinematic control by the distinction of a purport or the control device 24 for kinematic control whose absolute value of lateral acceleration G_y is beyond the reference value G_{y0} is performed is performed, it may be judged with transit data needing to be recorded.

[0042] While sum σV_i of V_i calculates whenever [wheel speed / of each wheel] in step 50 Distinction of whether sum σV_i of whenever [wheel speed] was set to 0 from the event of the absolute value of the condition that the absolute value of the order acceleration G_x is more than reference-value G_{x1} (forward constant), or lateral acceleration G_y being in the condition of being more than reference-value G_{y1} (forward constant) within the predetermined time amount T_c (forward constant), That is, after the magnitude of vehicle order acceleration or lateral acceleration becomes a very high value, distinction of whether the vehicle stopped progresses to step 100, when a line crack and affirmation distinction are performed, and when negative distinction is performed, it progresses to step 60.

[0043] In addition, the reference values G_{x1} and G_{y1} of the distinction in step 50 are set as the comparatively large value which is not produced at the time of the usual transit of a vehicle (the transit in usual acceleration and deceleration, a usual slope, etc. is included), respectively.

[0044] Distinction of whether in step 60, sum σV_i of V_i is 0 whenever [wheel speed / of each wheel], and the absolute value of the vehicle order acceleration G_x is more than reference-value G_{x2} (forward constant), That is, when distinction of whether the magnitude of the vehicle order acceleration with which a vehicle is in a idle state, and is detected is a very high value is performed and affirmation distinction is performed, it progresses to step 100, and when negative distinction is performed, it progresses to step 70.

[0045] Distinction of whether in step 70, sum σV_i of V_i is 0 whenever [wheel speed / of each wheel], and the absolute value of the lateral acceleration G_y of a vehicle is more than reference-value G_{y2} (forward constant), That is, when distinction of whether the magnitude of the lateral acceleration of the vehicle with which a vehicle is in a idle state, and is detected is a very high value is performed and affirmation distinction is performed, it progresses to step 100, and when negative distinction is performed, it progresses to step 80.

[0046] In addition, the reference values G_{x2} and G_{y2} of the distinction in steps 60 and 70 are set as the comparatively large value which is not produced in the usual stop condition (the stop in a slope etc. is included) of a vehicle, respectively.

[0047] It is chosen as record area for the storage area in which the oldest data are written among the storage areas M1-M3 of EEPROM44 in step 80 to record these data, is written in the record area where the transit data of the vehicle read in the present cycle in step 90 were chosen in step 80 by overwrite, and returns to step 10 after an appropriate time.

[0048] It is written in the section S3 of the record area as which the information on the purport which has a vehicle in the abnormal condition like a collision while the area where the judgment of the purport which has a vehicle in the abnormal condition like a collision in step 100 was performed, and transit data were recorded last time among storage areas M1-M3 is chosen as record area was chosen, and returns to step 10 after an appropriate time.

[0049] According to the operation gestalt of a graphic display, distinction of whether in step 20, the vehicle is an abnormal condition like the condition after accident is performed in this way. Since affirmation distinction is performed in step 20 and the kinematic control by the control unit 24 for kinematic control is forbidden in step 30 when the vehicle is an abnormal condition It can prevent certainly that unsuitable kinematic control is performed based on the unusual quantity of state detected by the sensor of an unusual condition.

[0050] Moreover, when a vehicle is in a normal condition, negative distinction is performed in step 20 and distinction of whether the transit data of a vehicle need to be recorded is performed in step 40. By performing negative distinction in step 40, when a vehicle is in the usual run state Although record of transit data is not performed, in the situation as [whose magnitude of the lateral acceleration of a vehicle is a very high value], affirmation distinction is performed in step 40. Unless distinction of the purport from which the vehicle is in the unusual condition in steps 50-70 is performed, transit data are recorded in steps 80 and 90.

[0051] On the other hand, when the vehicle is in the unusual condition, while setting they to be [any of steps 50-70], performing affirmation distinction and performing the judgment of an abnormal condition in step 100, the information is recorded, and, thereby, record of the transit data based on the overwrite to EEPROM44 is forbidden.

[0052] Therefore, if a vehicle will be in an abnormal condition by collision etc., since record of the transit data which record of the transit data after it is not performed, but are memorized by EEPROM44 by then will be maintained, transit data just before a vehicle will be in an abnormal condition can certainly be saved.

[0053] Especially distinction of whether according to the operation gestalt of a graphic display, the vehicle is in the unusual condition is performed by steps 50-70. Since distinction of whether the vehicle would be in the idle state is performed within the predetermined time amount T_c from the event of the absolute value of the condition that the absolute values of the order acceleration G_x are one or more reference values G_x , or lateral acceleration G_y being in the condition of being one or more reference values G_y , in step 50 After the magnitude of acceleration becomes very large by the collision of a vehicle etc., the unusual condition that the vehicle stopped can be judged certainly.

[0054] Moreover, since a vehicle is in a idle state, respectively, distinction and the vehicle of whether the absolute values of the vehicle order acceleration G_x are two or more reference values G_x are in a idle state in steps 60 and 70 and distinction of whether the absolute values of the lateral acceleration G_y of a vehicle are two or more reference values G_y is performed An abnormal condition toward which the installation condition of the order acceleration sensor 30 or the lateral acceleration sensor 32 became unusual by the collision of a vehicle etc., or the vehicle itself inclined unusually can be judged certainly.

[0055] Although this invention was explained above about the specific operation gestalt at the detail, probably this invention will not be limited to an above-mentioned operation gestalt, and it will be clear for this contractor its for other various operation gestalten to be possible within the limits of this invention.

[0056] For example, it sets in an above-mentioned operation gestalt. Although distinction of whether the vehicle would be in the idle state is performed within the predetermined time amount T_c from the event of the absolute value of the condition that the absolute values of the order acceleration G_x are one or more reference values G_x , or lateral acceleration G_y being in the condition of being one or more reference values G_y , in step 50 The acceleration G_{xy} of a vehicle calculates as a square root ($G_x^2 + G_y^2$) ($1/2$) of the sum of the square of the order acceleration G_x , and the square of lateral acceleration G_y . Distinction of whether the vehicle would be in the idle state may be performed within the predetermined time amount T_c from the event of the absolute value of the acceleration G_{xy} of a vehicle being in the condition of being more than reference-value G_{xy1} (forward constant).

[0057] It sets in an above-mentioned operation gestalt similarly. Step 60 And although a vehicle is in a idle state in 70, respectively, distinction and the vehicle of whether the absolute values of the vehicle order acceleration G_x are two or more reference values G_x are in a idle state and distinction of whether the absolute values of the lateral acceleration G_y of a vehicle are two or more reference values G_y is

performed A vehicle is in a idle state and distinction of whether the absolute value of the acceleration Gxy of a vehicle is more than reference-value Gxy2 (forward constant) may be performed.

[0058] Moreover, although it is distinguished whether the vehicle speed is 0 and a vehicle is in a idle state in an above-mentioned operation gestalt by whether sum $\sum V_i$ of V_i is 0 whenever [wheel speed / of each wheel] Distinction of whether a vehicle is in a idle state may be performed by whether sum $\sum V_i$ of whenever [wheel speed] is below the reference value V_0 (forward constant near 0), and may be performed by whether the maximum of the $V_i(s)$ is below the reference value V_{w0} (forward constant near 0) whenever [wheel speed / of each wheel].

[0059] Furthermore, in an above-mentioned operation gestalt, although EEPROM54 has three storage areas M1-M3 and the ID number consists of a figure of 0-9, these numbers may be the number of arbitration, and the transit data of the vehicle recorded on EEPROM54 may also be data of arbitration.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the outline block diagram showing one desirable operation gestalt of the transit data recorder for vehicles by this invention applied to the vehicle with which kinematic-control equipment was carried.

[Drawing 2] It is the block diagram showing the transit data recorder shown in drawing 1.

[Drawing 3] It is the explanatory view showing the storage area of EEPROM of a transit data recorder.

[Drawing 4] It is the flow chart which shows the record control routine of the transit data in the operation gestalt of a graphic display.

[Description of Notations]

- 10FR-10RL -- Wheel
- 14 -- Damping device
- 16 -- Hydraulic circuit
- 24 -- Control unit for kinematic control
- 28FR-28RL -- It is a sensor whenever [wheel speed].
- 30 -- Order acceleration sensor
- 32 -- Lateral acceleration sensor
- 34 -- Steering angle sensor
- 40 -- Control unit for transit data logging
- 52 -- Microcomputer
- 54 -- EEPROM

[Translation done.]

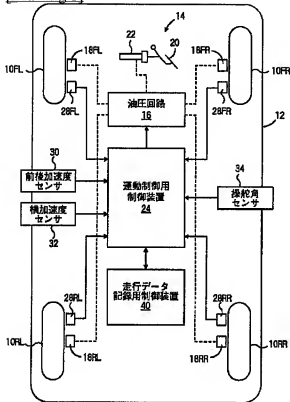
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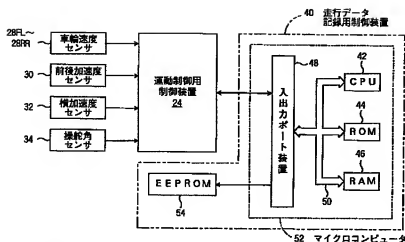
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DRAWINGS

[Drawing 1]



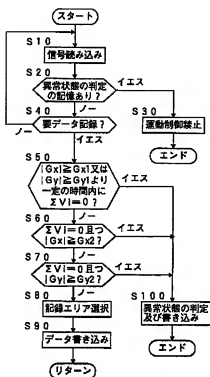
[Drawing 2]



[Drawing 3]

S4	M1			M2			M3		
S1	ID番号			ID番号			ID番号		
	車輪速度 Vfr			車輪速度 Vfr			車輪速度 Vfr		
	車輪速度 Vfl			車輪速度 Vfl			車輪速度 Vfl		
	車輪速度 Vrr			車輪速度 Vrr			車輪速度 Vrr		
S2	車輪速度 Vrl			車輪速度 Vrl			車輪速度 Vrl		
	前後加速度 Gx			前後加速度 Gx			前後加速度 Gx		
	横加速度 Gy			横加速度 Gy			横加速度 Gy		
	操舵角 θ			操舵角 θ			操舵角 θ		
	スリップ率 Rsfrr			スリップ率 Rsfrr			スリップ率 Rsfrr		
	スリップ率 Rsfll			スリップ率 Rsfll			スリップ率 Rsfll		
	スリップ率 Rsrerr			スリップ率 Rsrerr			スリップ率 Rsrerr		
	スリップ率 Rsrll			スリップ率 Rsrll			スリップ率 Rsrll		
S3	判定結果			判定結果			判定結果		

[Drawing 4]



[Translation done.]